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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/672,753	09/28/2000	Juha Heiskala	NC17164	8018
30973	7590	11/16/2004	EXAMINER	
SCHEEF & STONE, L.L.P. 5956 SHERRY LANE SUITE 1400 DALLAS, TX 75225			AHN, SAM K	
			ART UNIT	PAPER NUMBER
			2637	

DATE MAILED: 11/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/672,753

Applicant(s) ☒

HEISKALA ET AL.

Examiner

Sam K. Ahn

Art Unit

2637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on amendment received on 8/6/04.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1,7-13 and 18-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,7-13 and 18-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 September 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/27/04 has been entered.

### ***Drawings***

2. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, *the demodulator, as claimed in claim 10* must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several

views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Claim Objections***

3. Claims 1,7-13 and 18-21 are objected to because of the following informalities:

In claims 1,10 and 21, lines 6-7,5 and 6-7, respectively, delete "indications of the".

In claim 13, line10, delete "the signal constellation,".

Claims 7-9,11,12 and 18-20 directly or indirectly depend on claim 1 or 13.

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1,7-13 and 18-21 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably

convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In claims 1 and 13, lines 9 and 7, respectively, recite "longer-than-average length", while the specification, note p.10, describes as "longer length".

In claim 21, line 10, recite "shorter-than-average length", while the specification, note p.9, describes as "shorter length". Thus, the claims contain subject matter, as to how the shorter or longer length are averaged, which was not described in the specification to convey to one skilled in the art at the time the application was filed.

Claims 7-12 and 18-20 directly or indirectly depend on claim 1 or 13.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1,7-13 and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Alamouti (cited previously) in view of Wei (cited previously).

Regarding claims 1,13 and 21, Alamouti discloses a method and apparatus in a communication system having a sending station (see Fig.2) for sending data upon a communication channel comprising a multi-dimensional trellis-coded modulator coupled to receive indications of the data to be sent by the sending station, said

multi-dimensional trellis-coded modulator for forming N-dimensional (two) trellis-encoded sequences therefrom. (see Fig.2 where the data from binary source is converted by TCM encoder and modulated) Further, a first and at least a second transmit antenna coupled to said multi-dimensional trellis-coded modulator (see Fig.1 and 2), a first and second N-dimensional sequences transduced by its corresponding transmit antenna (note Table 1, and note p.704-706), and providing orthogonal transmit diversity. Alamouti uses two-dimensional trellis-encoded modulation as the multi-dimensional trellis-coded modulator having transmit diversity by using two transmit antennas and M receive antenna, which provides the diversity order of  $2M$  at the receiver. (note paragraph 1 and 4, p.704) Alamouti further teaches encoding the data, mapping the (OFDM) multi-dimensional trellis-codes prior to modulating. (note Table 1, and note p.704-706) The Examiner assumes that claim 9, where the "said multi-dimensional trellis codes" is "said multi-dimensional trellis encoded modulator". Alamouti further teaches mapping is positioned into subsets (see Table 1) of selected minimum squared distances. (note column 2 in p.705)

However, Alamouti does not teach wherein dimensional value is greater than two, and does not explicitly teach the rule of correspondence. Wei (cited previously) teaches multi-dimensional trellis-coded modulation for fading channels and classifies trellis-coded modulator into: two-dimensional trellis-coded modulation and multi-dimensional trellis-coded modulation. (note col.1, lines 23-25) Wei further illustrates multi-dimensional trellis-coded modulation (see Fig.4-7), and explains trellis

modulation implementing intrasubset and intersubset and as a result minimizes time diversity in the multidimensional trellis code. (note col.2, lines 17-54) The rule of correspondence is further explained as the partition rules or partition chain, partitioning to different subsets or families having longer or shorter length. (note col.4, line 15 – 63, col.5, lines 16-41) Therefore, it would have been obvious to one skilled in the art at the time of the invention to implement multi-dimensional trellis-coded modulation, as taught by Wei, in Alamouti's system in the multi-dimensional trellis-coded modulator means for the purpose of taking advantage the multi-dimensional trellis-coded modulation has over the two-dimensional trellis-coded modulation, such as higher coding gains and lower decoder complexities when used in fading channels. And further, it would have been obvious to one skilled in the art at the time of the invention to implement the rule of correspondence or the partition rule in the multi-dimensional trellis-coded modulator means of Alamouti for the purpose of maximizing the minimum time diversity, as taught by Wei (note col.8, lines 1-13).

Regarding claim 7, Alamouti in view of Wei teach all subject matter claimed, as applied to claim 1. Alamouti further teaches the multi-dimensional trellis-encoded modulator utilizing a Wei construction, having a multi-dimensional construction. (note Table 1, and note p.704-706)

Regarding claims 8 and 18, Alamouti in view of Wei teach all subject matter claimed, as applied to claim 1 or 13. Alamouti further teaches wherein the first and second N-dimensional sequences applied to said first and second transmit antennas, respectively, comprise Radon-Hurwitz transforms, as having equivalent construction. (note Table 1, and note p.704-706)

Regarding claim 9, Alamouti in view of Wei teach all subject matter claimed, as applied to claim 1. Alamouti further teaches encoding the data, mapping the (OFDM) multi-dimensional trellis-codes prior to modulating. (note Table 1, and note p.704-706) The Examiner assumes that claim 9, where the "said multi-dimensional trellis codes" is "said multi-dimensional trellis encoded modulator".

Regarding claim 10, Alamouti in view of Wei teach all subject matter claimed, as applied to claim 1. Furthermore, Alamouti teaches a demodulator (see Fig.3, rx chain) coupled to receive indications of the data received at the receiving station, said demodulator for demodulating the indications to form separate sequences, the separate sequences used to estimate symbol values. (note p.706-707)

Regarding claims 11 and 19, Alamouti teaches all subject matter claimed, as applied to claim 1 or 13. The environment of Alamouti's system is related to a wireless communication system implementing trellis coded modulation and transmit diversity for the purpose of increasing coding gains. As fading is a problem in any



wireless communication environment, although Alamouti does not explicitly disclose using the system in a WLAN environment, it would have been obvious to one skilled in the art at the time of invention to implement in any environment with fading problems, as Alamouti's system pursues to overcome the problem. A method or apparatus capable of overcoming a fading problem or having an advantage of having a coding gain, one skilled in the art would be motivated to implement the same method or apparatus in any other environment, where Fig.2 may be viewed as an access point, such as WLAN for the purpose of overcoming the same problem and having the same advantage.

Regarding claims 12 and 20, Alamouti in view of Wei teach all subject matter claimed, as applied to claim 11 or 19. Although Alamouti does not explicitly disclose the data communicated by said first and second transmit antennas communicating at a rate specified by IEEE 802.11 standard, it is inherent that the system functions as recited since the standard is mainly for WLAN, it would have been obvious to one skilled in the art to communicate at the specific rate for the purpose of effectively transmitting and receiving data, otherwise, the system would not operate seamlessly with other systems operating under the same standard.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sam Ahn whose telephone number is (571) 272-3044. The examiner can normally be reached on Monday-Friday.

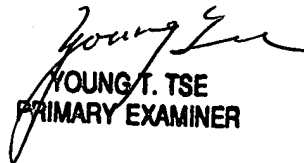
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on (571) 272-2988. The fax phone

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number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Sam K. Ahn  
11/4/04

  
YOUNG T. TSE  
PRIMARY EXAMINER